Journal of the Kansas Entomological Society

(Central States Entomological Society)

Vol. 28 October, 1955 Number 4

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Entered as second-class matter June 7, 1939 at the Post Office at Manhattan, Kansas, under the Act of August 24, 1912.

JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY

A quarterly journal published in January, April, July, and October devoted to Entomology in the Western Mississippi Basin and the proceedings of the Kansas Entomological Society.

Manuscripts for publication may be sent to the Acting editor, Wallace E. LaBerge, Department of Entomology, University of Kansas, Lawrence, Kansas or to any member of the publication committee.

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KANSAS ENTOMOLOGICAL SOCIETY

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Vol. 28, No. 4, October 1, 1955

This issue mailed October 8, 1955

Kansas Entomological Society
Vol. 28 October, 1955 Number 4

THE OVERWINTER SURVIVAL OF AMERICAN DOG TICK EGGS

CLUFF E. HOPLA[1]

The biology of *Dermacentor variabilis* (Say, 1821), commonly known as the American dog tick, has been the subject of several investigations. Notable among these were those conducted by Hooker, Bishopp, and Wood (1912), and Smith, Cole, and Gouck (1946). The latter authors observed that eggs survived the winter under specified outdoor conditions. However, no information is available concerning the over-winter survival of this tick's eggs under natural conditions.

In conjunction with a flea population study of the nest material of *Neotoma floridana osagensis*, egg masses of this tick were encountered on two occasions which indicated overwinter survival of the egg stage in nature.

On February 26, 1949, a wood rat nest was taken 4½ miles east and 2½ miles north of Lawrence, Douglas County, Kansas. This was a small mound, measuring 3 feet long, 2½ feet wide, and 14 inches high, composed of small twigs, dung from various animals, and grass. A good proportion of the mound was wet and did not appear to offer the expected protection to the inner nest. However, the inner nest was dry, lined with dry grass and the shredded bark of the Osage orange tree. The nest was occupied by an adult male rat which was captured and found free of ticks.

On returning to the laboratory the nest was given a cursory examination in a large white enamel pan before being placed in a modified Berlese funnel. A total of one thousand tick eggs were discovered which appeared to be viable and to contain fully developed larvae. These eggs were stored in tick tubes (Hopla, 1953) at a relative humidity of 85 per cent at room temperature. Within 24 hours larvae were emerging from the eggs and within 72 hours most of the remaining eggs had hatched.

On March 2, 1951, a second mass of the American dog tick eggs was encountered in a wood rat nest collected in McClain County, 8 miles west of Norman, Oklahoma. This mound was large, measuring approximately 6 feet long, 4 feet wide, and 3 feet high. The inner nest consisted of dry grass, the remaining portion consisting of sticks, coarse grass, and dung from various animals. The mound was constructed around the base of a large wild grape vine. A female wood rat was captured from this mound and the inner nest material was collected.

On returning to the laboratory the nest material was examined as before and 500 eggs were obtained. These eggs began hatching within 48 hours after this examination and hatching was completed 96 hours later. These eggs were stored under conditions similar to that reported for the first egg mass. Apparently several eggs were missed in the cursory examination of this nest as a few eggs were found in fluid traps of the Berlese funnel within the first 12

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hours. Thirty-six hours after the nest material was placed in the funnels, larvae were also obtained. No larvae were observed in the nest materials before being placed in the funnels.

In both instances approximately 95 per cent of the eggs collected hatched. In contrast to the observations of Smith *et al* (1946) who reported that larvae which overwintered under outside conditions were abnormally shortlived, these larvae fasted for a total of 200 days, at which time they were given the opportunity to feed. Good attachment was secured and the adults which were subsequently obtained from these larvae produced eggs within the ranges reported by the above authors.

The question arises as to how the egg masses of *D. variabilis* came to be located in the inner part of a wood rat nest, particularly since it is often implied that this type of animal is not a host for the adult stage of this tick. Moreover, little is known concerning the role of *Neotoma* species for the immature stages of this tick. Possibly, the engorged females may have detached from an appropriate host near or on the mound and then migrated to the inner part of the nest, or actually, they might have engorged on the rodent itself. Occasionally, adults in an unengorged state have been found attached to *Neotoma floridana osagensis* and *Neotoma micropus micropus*. Immature stages have been recovered repeatedly from these two species of *Neotoma*, despite the fact that only one nymph has been perviously reported (Bishopp & Trembly, 1945). It is believed that the wood rats in the areas indicated are more important as hosts of immature stages of this tick than previous records have shown.

SUMMARY

Two observations are reported which indicate that under favorable conditions the eggs of *D. variabilis* aparently overwintered and that the progeny which resulted from these eggs had normal life histories; nor was the fecundity of these ticks impaired.

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Errata. Two errors appeared in the note by Cluff E. Hopla in the July issue of the Journal. The reference in parentheses in the third paragraph on page 115 should read Hooker, *et al*, 1912. In the references on page 116, the fourth entry should read: Hooker, W. A., Bishopp, F. C. and Wood, H. P. 1912. The life history and bionomics of some North American ticks, U.S.D.A. Bur. Ent. Bull. 106:61-67.

—EDITOR

NEW GENERA AND SPECIES OF NORTH AMERICAN TACHINIDAE (DIPTERA)[1]

H. J. REINHARD
College Station, Texas

The genera and species described in this paper are based mainly upon specimens received for identification from several sources as mentioned under the descriptions which follow. Unless otherwise specified the types are in my collection.

Tesseracephalus, n. gen.

Traces to *Jurinodexia* in Townsend's 1936 manual key to Prosenini but differs in numerous characters. Head profile subquadrate, antennal axis well below eye middle and barely longer than vibrissal axis; clypeus much smaller than usual, somewhat depressed at sides and slightly raised along median line to about lower fourth thence flattened into epistomal plane; facial ridges bare; vibrissae far above lower edge of head and approximated; epistoma strongly narrowed at vibrissal axis, widening downward and produced to about one-half clypeal length; male cheek about three-fourths, female subequal eye height; parafacial unusually steep and exceeding clypeal width, sparsely short-haired; frontal bristles in a single row extending from narrowest part of front (before triangle) to antennal base; outer verticals not differentiated; ocellars proclinate; antenna rather short, reaching over half-way to vibrissae; arista plumose to tip, hardly exceeding combined length of last two antennal segments; proboscis about one and one-half times head height, haustellum very slender and bristlelike; straight to slightly bowed backward before tip, labella elongate and narrow; palpus subfiliform, about as long as antenna; eye bare. Thoracic chaetotaxy: acrostichal 1, 2; dorsocentral 3, 3; intraalar 3; presutural 2, (inner one sometimes absent); notopleural 2; humeral 3; posthumeral 1; sternopleural 2, 1; pteropleural 1-2 (smaller than sternopleural); scutellum with 2 lateral, 1 equally strong decussate apical and 1 to 4 suberect irregular discal pairs; prosternum and propleuron bare, postnotal slope with or without a few short inconspicuous hairs at upper margin; infrascutellum normally developed. Legs long, rather slender and moderately bristled, tarsi longer than tibiae. Wing long extending well beyond tip of abdomen; costal spine strong; first posterior cell narrowly open to closed at costa distinctly before wing tip; fourth vein at times becoming evanescent beyond cubitulus; latter occasionally bearing a short stump. Abdomen narrower and distinctly longer than thorax, one pair of median marginal bristles on first two segments (weak and sometimes absent on first), a marginal row on last two, a discal row on fourth and one discal pair on intermediate segments; male hypopygium rather small and retracted; sternites covered.

Genotype: *Tesseracephalus lenis*, n. sp.

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[1] Contribution No. 2230, from the Department of Entomology, Texas Agricultural Experiment Station.

Tesseracephalus lenis, n. sp.

Male. Front constricted before triangle and widening rapidly downward into facial angle, vertex 0.18 of head width; parafrontal and parafacial cinereous, broad cheek thinly gray pollinose on reddish background; frontalia deep red to blackish, narrowed upwards; antennal segments one and two yellow, third largely black, less than twice as long and distinctly narrower than second; arista brownish and bulbous at base slender and paler beyond, proximal segments short; cheek bare; palpus dark brown to black; back of head somewhat bulged or swollen on lower half or more, flattened above, clothed with a sparse vestiture of black hairs.

Thorax gray pollinose on black ground color, four or five narrow dark vittae before suture and three broader ones behind, which stop well before base of scutellum; latter black with rather heavy lusterless gray pollen above. Legs black, mid tibia with one anterodorsal bristle near middle; claws and pulvilli about as long as last tarsal segment. Wing subhyaline; veins including costa yellow, third vein with two to four small hairs near base, others bare; hind cross vein bisinuate, midway to slightly nearer cubitulus; calypter white with a faint tawny tinge; epaulet black, subepaulet yellow.

Abdomen wholly black dusted with dense opaque grayish pollen, which in an oblique lateral view appears distinctly limited along median line at side, each segment below latter with thinner more lustrous bluish white pollen; median marginals on first segment and discals on second sometimes reduced in size or entirely absent.

Female. Front at vertex 0.42 of head width; two large proclinate orbitals and one equally large reclinate divaricate pair; outer verticals directed laterally, stout but a little shorter than inner; cheek including lower part of parafacial and posterior orbit deep red in ground color, at most slightly pruninose in favorable view; claws and pulvilli shorter than apical tarsal segment; first abdominal segment without median marginals; genitalia retracted within narrowed tip of abdomen.

Length, 7-9 mm.

Holotype male and *allotype* female, Acatlipa, Morelos, Mexico, July 14, 1950 (W. G. Downs). Paratypes 9 males all from Mexico as follows: San Juan del Rio, Durango, August 7, 1951, Teheucan, Puebla, August 23, 1951; N. Chapalilla, Nay., July 19, 1951 (P. D. Hurd); Leon, 5800 ft., August 19, 1954; Lagos de Moreno, 6300 ft., August 12, 1954; Texpan, 7500 ft., August 12, 1954 (R. R. Dreisbach); "15 mi. S. Pujal Sp. June 21, 1953, Univ. Kans. Mex. Expedition."

Messiomyia, n. gen.

A minute species similar to *Aphantorhapha* but with a shorter stouter proboscis, more deeply depressed clypeus, longer frontal profile, etc.

Head wider than high, antennal axis well above eye middle and nearly twice length of oral; slightly receding facial profile distinctly longer than frontal; epistoma short, full width in clypeal plane; facialia subvertical, with three or four bristly hairs on lower extremity; vibrissae decussate at

tips on oral margin near lower border of head; parafacial narrow, bare; two pairs of proclinate orbitals and verticals in both sexes; ocellar proclinate; frontals in a single row of about six bristles, lower two moderately divergent beneath antennal base; vertex 0.35 of head with, front widening gradually forward into facial angle; antenna reaching to oral margin, first segment short, second about one-fifth as long as third; arista bare, proximal segments short; proboscis hardly equal to length of eye, latter bare; palpus as long as haustellum, a little thickened at tip; cheek about one-sixth eye height descending almost to vibrissal level; occiput flattened with a slight bulge at middle below. Thoracic chaetotaxy: acrostichal 3, 3; dorocentral 3, 3; intraalar 3; supraalar 3; presutural 2; posthumeral 2; humeral 3; postalar 2; intrapostalar small but distinct; sternopleural 2, 1; pteropleural 1 (small); scutellum with 3 lateral, 1 minute or hairlike apical but no distinct discal pair; transverse suture well defined on entire width; propleuron and postnotal slope bare; prosternum bristled. Legs moderately long but not very slender; weakly bristled, hind tibia not ciliate; claws and pulvilli minute in both sexes. Wing reaching well beyond tip of abdomen; first vein bare, second with about 2 setulae near base; first posterior cell open almost in exact wing tip; last section of fifth vein about one-fourth as long as preceding; costal spine vestigial; calypter a little longer than wide. Abdomen ovate, more broadly so in female; no discals; proximal segments bearing one pair of median marginals and last two segments each with a marginal row; sternites covered or mostly so.

Genotype: *Messiomyia triconis,* n. sp.

Messiomyia triconis, n. sp.

Male. Head cinereous pollinose on dark ground color; frontalia deep red, about one-half as wide as parafrontal; latter practically bare outside frontal row; antenna black, basal segments a little paler or obscurely reddish; arista blackish, thickened on basal two-fifths; palpus pale yellow; cheek finely and rather sparsely black-haired.

Thorax black, with heavy opaque gray pollen especially on mesonotum which shows four narrow poorly defined dark vittae, outer pair interrupted at suture; scutellum black, disk with a vestiture of suberect but rather short black hairs. Legs blackish, subshiny; mid tibia with one good-sized bristle on outer front side near middle. Wing clear, gray hyaline; veins yellow; calypters white.

Abdomen brownish black with sides and venter paler or reddish in ground color; last three segments with rather dense gray pollen above becoming thinner on hind margin of each and along median line of segments two and three; genitalia small, retracted.

Female. Similar to male but the third antennal segment shorter, narrower and the two basal ones more distinctly red; abdomen broader and more pointed apically; genitalia retracted, without piercer.

Length, 4 mm.

Holotype male and *allotype* female, labeled "Tex" without additional data. Paratype 1 male, Hidalgo Co., Texas July, 1931 (J. W. Monk).

Sipholeskia loriola, n. sp.

Readily distinguished from the genotype (*Masicera eucerata* Bigot), by the pale vestiture of the cheeks and thorax; also, the aristae are short-haired to the tips.

Male. Head pollen pale to golden becoming lustrous downward on face, cheek and posterior orbit; front at vertex 0.25 of head width gradually diverging forward into facial angle; frontalia reddish, about as wide as parafrontal; latter with only a few scattered hairs outside frontal row, which extends well below antennal base; outer verticals strong to weak (in the two available specimens); ocellars generally weak, proclinate; parafacial bare, slightly narrowed downward; antenna red to or below arista thence black, third segment about four times longer than second and reaching almost to epistoma, which is nasutely produced; vibrissae strong, slightly above oral margin, not approximated; clypeus but little depressed, strongly widened downward; facialia narrow, flattened and bare; cheek nearly one-fifth eye height; eye bare; proboscis about one and one-half times head height, haustellum slender, shining brown, labella small; palpus as long as antenna, subcylindric, yellow; occiput gently convex, clothed with yellowish white pile.

Thorax largely black with rather heavy yellow pollen on notum which shows four or five narrow dark vittae in most views, pleura with thinner pale or whitish pollen; acrostichal 2, 1; dorsocentral 3, 3; intraalar 3; supraalar 3; presutural 1 (outer); humeral 3; sternopleural 2, 1; pteropleural 1 (small); intrapostalar weak; scutellum with 3 lateral 1 small decussate apical and 1 discal pair; prosternum, propleuron and postnotal slope bare. Legs reddish tarsi black and longer than tibiae; claws and pulvilli equal to or exceeding last tarsal segment. Wing subhyaline and as long as body; first posterior cell open shortly before wing tip; cubitulus broadly rounded without stump or fold; third vein with 3 to 5 setulae near base; costal spine minute; calypters yellow; epaulet and subepaulet black.

Abdomen reddish yellow with a black pollinose median vitta sometimes interrupted on basal segments but widening rearward and usually including all of fourth; no median marginal bristles on first segment, one pair on second and a marginal row on each of last two; genital segments red, pollinose basally; forceps united, flat behind and thin in profile, tapering evenly to an acute slightly bowed tip; accessory process as long as forceps but considerably wider in profile; fifth sternite with a moderately wide V-shape median incision; lobes black, moderately beset with long black hairs.

Female. Similar to male except as follows: vertex 0.28 to 0.30 of head width; two proclinate orbitals; third antennal segment two and one-half times length of second; abdomen wider than thorax, median black vitta entire and well defined; genitalia retracted, anal orifice small; claws and pulvilli short.

Length, 10-11 mm.

Holotype female and *allotype* male, Brownsville, Texas, August 14, 1945 (F. A. Cowan). Paratypes: 1 female, Hidalgo Co. Texas, August 6, 1931;

1 male and 5 females, Cuernavaca, Mexico, August 15, 1954 (R. R. Driesbach); and 1 female, Alpuyeca, Morelos, Mexico, July 3, 1951 (P. D. Hurd).

Milonius, n. gen.

Male only. Head about as wide as high and nearly circular in frontal aspect; eye hairy, unusually large, twice longer than wide and reaching far below vibrissal level; clypeus moderately depressed; epistoma one-half as long as clypeus and widened downward from full width of same; frontal profile nearly one-third longer than facial; antennal axis on eye middle and subequal oral margin axis; vertex 0.16 of head width, front gradually widening forward into facial angle; frontals in a single row extending two or three bristles beneath antennal base and becoming smaller toward vertex but prevertical pair well differentiated; ocellars, fronto orbitals and outer verticals absent; parafacial bare, barely narrowed downward and subequal width of third antennal segment; latter not reaching to vibrissae, two times longer than second segment; arista micro pubescent, moderately thickened on basal fourth, proximal segments small; facialia bearing a few hairs on lowest fourth; vibrissae stout, decussate, about three-fourths length of third antennal segment above oral margin; cheek about one-twelfth eye height; proboscis short, stout, labella fleshy; palpus a little shorter than haustellum, slender with tip slightly thickened; occiput flattened, clothed with pale pile. Thoracic chaetotaxy: acrostichal 3, 2; dorsocentral 3, 4; intraalar 3; supraalar 3; notopleural 2; presutural 2; posthumeral 2; humeral 4; postalar 4-6; intrapostalar strong; pteropleural 3-5 (small); sternopleural 2; scutellum with 4 to 5 lateral, 1 equally large non-decussate apical and two pairs of smaller subdiscals set far behind middle of disk; propleuron and postnotal slope bare; prosternum setose. Legs rather slender but not very long; hind tibia closely evenly ciliated on outer posterior margin; claws and pulvilli nearly equal to combined length of last two tarsal segments. Wing clear; first posterior cell open shortly before wing tip; cubitulus without stump or fold, a little over length of small cross vein from hind margin; apical and hind cross veins about in same oblique plane, latter joining fourth vein much nearer cubitulus than small cross vein; costal spine vestigial; calypter large. Abdomen as wide and as long as thorax; three basal segments without median marginal bristles, fourth beset with erect bristles and hairs on entire upper surface; genital segments small retracted; sternites covered.

Genotype: *Milonius scordalus,* n. sp.

Milonius scordalus, n. sp.

Male. Head rather densely gray to subsilvery pollinose; parafrontal clothed with fine black hairs from vertex to middle or slightly beyond, thence with intermixed pale and black hairs to level of lowermost frontal bristle; frontalia deep brown, subequal parafrontal width on entire length; antenna three-fourths as long as face, proximal segments and base of third on inner side reddish yellow, remainder of latter segment black; arista black; cheek wholly pale-haired below but with intermixed white and black

hairs above middle; palpus reddish yellow, beset with few pale and dark hairs; occiput gray pollinose.

Thorax black scutellum with a reddish tinge in ground color, dusted with moderately heavy grayish pollen leaving five narrow but well defined black notal vittae; sternopleuron clothed with soft yellowish hairs, remainder of thoracic vestiture uniformly black; anterior spiracle large, orange yellow. Legs black coxae and trochanters more or less reddish and beset with yellow and black hairs; fore tibia with two median posterolateral bristles. Wing gray hyaline with a slight yellow tinge near base; first vein bare, third with three to five setae near base; eqaulet and subepaulet black.

Abdomen reddish brown, dusted with gray pollen which in flat rear view shows a dark median vitta and on either side of latter two rows of subshining spots which change from light to dark when viewed in opposite angles; hair on entire upper surface of three basal segments short and depressed, vestiture on anal segment much longer, suberect and bristly; row of marginal bristles on third segment obsolete above except at sides; fifth sternite black, deeply incised but lobes not divergent, clothed with pale pubescence, narrow inner margin of each polished black. Female not known.

Length, 7-8.5 mm.

Holotype male, Dilley, Texas, May 21, 1920 (H. J. Reinhard). Paratypes: 2 males, Neuvo Morelos, Mexico, 1400 ft., July 21, 1954 (R. R. Dreisbach).

Lydina immista, n. sp.

Runs to *Lydina* in most available keys, but differs from the common nearctic *L. areos* in having the head and abdomen distinctly pollinose, parafrontals at most feebly subshining.

Male. Eyes rather small, thickly long pilose; frontal bristles descending to middle of face; ocellars large, divaricate to proclinate; verticals two pairs; frontalia opaque black, at middle about as wide as parafrontal; latter thinly pollinose, clothed with coarse to bristly hairs which descend on parafacial to near level of lowest frontal; vertex 0.35 of head width, front widening rapidly into facial angle; face with lusterless plumbeous pollen becoming subshining on cheek; latter fully two-thirds eye height, clothed with long black hairs; antenna black, third segment nearly three times longer than second; arista bare, thickened on proximal three-fourths or more, middle segment elongate, basal one short but distinct; haustellum subequal length of palpus, latter black with tip sometimes paler; occiput clothed with a dense vestiture of pale hairs.

Thorax subshining black, notum without vittae behind suture; acrostichal 3, 3; dorsocentral 3, 3; intraalar 3; supraalar 3; presutural 1 (outer); sternopleural 3; pteropleural 1 (large as sternopleural); scutellum with 3 lateral, 1 discal and 1 weaker upturned decussate apical pair; postnotal slope and sides of prosternum setose. Legs black; mid tibia with two stoutish antero dorsal bristles; claws and pulvilli nearly as long as last tarsal segment. Wing gray hyaline with a slight yellowish tinge near base; third vein with 3 to 6 setulae extending less than half-way to small cross vein;

apical cell closed to short petiolate a little before wing tip; costal spine doubled, longer than small cross vein; calypter white to pale tawny. Abdomen black, last three segments basally with rather dense gray pollen which extends thinly to hind margin of each above; one pair of median marginal bristles on segment two and a marginal row on three and four, besides one discal pair on three and a discal row on anal segment; genital segments black retracted; forceps short, thin in profile, bowed and tapered to tip; accessory process polished black, wider than forceps and rounded apically; fifth sternite black, with a deep median V-shaped incision, beset with sparse black hairs.

Female. Vertex 0.37 of head width; two proclinate orbitals; frontalia narrower than parafrontal; palpus reddish beyond middle; third antennal segment two and one-half times length of second; claws and pulvilli shorter than last tarsal segment; fore tarsus slightly flattened and widened; abdomen more tapering apically, genitalia retracted.

Length, 6-7 mm.

Holotype male and *allotype* female, Popocatapetl, 12,000 ft., Mexico, August 11, 1954 (R. R. Dreisbach) in the U. S. National Museum. Paratypes: 3 males, same data as type.

Mimologus, n. gen.

Similar to *Siphosturmiopsis* but with parafacials hairy.

Male only. Haustellum rather slender but not quite one-half head height, palpus thickened and bowed upward beyond middle; cheek about one fourth eye height; epistoma moderately produced downward and bowed forward from clypeal plane; vertex subequal eye width; proclinate ocellars and inner verticals well developed; main frontal rows widely divergent anteriorly on parafacials, descending nearly to level of arista; third antennal segment narrower than parafacial and twice length of second; arista micro pubescent, thickened to middle or beyond, basal segments small; clypeus moderately depressed, facial ridges rounded or flattened, bearing four or five bristly hairs on lower extremity; vibrissae well above oral margin; eye bare, reaching nearly to vibrissal level. Thoracic chaetotaxy: acrostichal 3, 3; dorsocentral 3, 4; intraalar 3; supraalar 3; presutural 2; notopleural 2; sternopleural 4; pteropleural 1 (smaller than stenopleural); humeral 4; posthumeral 2; postalar 3; intrapostalar differentiated, scutellum with 3 lateral, 1 goodsized decussate apical and 1 depressed discal pair; propleuron and postnotum beneath calypter bare; prosternum setose on sides; infrascutellum well developed. Hind tibia ciliate on outer posterior margin with one longer stouter bristle near middle of row. Wing ordinary in size and shape, first posterior cell open well before extreme tip; third vein with two to four setulae near base; costal spine vestigial. Abdomen subconical; basal segments each bearing one pair of short separated median marginal bristles, a complete marginal row on third and the anal segment with entire upper surface beset with irregularly spaced bristles intermixed with erect hairs; sternites covered; hypopygium small retracted.

Genotype: *Mimologus effetus,* n. sp.

Mimologus effetus, n. sp.

Male. Parafrontal and parafacial clothed with black hairs; frontal rows doubled anteriorly, uppermost two bristles equal in length, stout, reclinate; front at vertex 0.32 of head width, equibroad on upper third, thence widening rapidly downward into facial angle; reddish frontalia narrower than parafrontal, nearly obscured by pollen; antenna reaching lower fourth of face, black with second segment at times showing a reddish tinge; arista black; haustellum shining brown, rather slender, labella small and soft in texture; palpus yellow; occiput cinereous, beset with a dense vestiture of pale hairs.

Thorax black, moderately gray pollinose, notum showing five broadish dark vittae in favorable light; scutellum and posterior callus wholly red in ground color, lightly dusted with changeable silvery pollen; pleura moderately shining but pruinose and clothed with a vestiture of rather dense black hairs, which are erect but not very long on notum. Wing gray hyaline, veins brownish; hind and apical cross veins about in same oblique plane; cubitulus subrectangular, without a stump; calypter large, opaque white; epaulet and subepaulet black. Legs entirely black; mid tibia with one large bristle on outer front side near middle; claws and pulvilli elongated.

Abdomen reddish on sides and venter anal segment wholly black, this color extending forward along median line of intermediate segments; latter with whitish pollen above which extends thinly to hind margin of each but is confined to basal half or less on the following segment; venter moderately shining with opaque sublateral pubescent patches on segments three and four.

Length, 10 mm.

Holotype male, Tanbark Flat, Los Angeles Co. Calif., July 12, 1952, (D. E. Barcus). Paratypes: Two males, same data as type and 1 male "Riverside Co. Calif. April 18, 50."

A NEW *METROBATES* FROM THE GULF STATES (Hemiptera: Gerridae)

CARL J. DRAKE
Ames, Iowa

This is the second species of the genus *Metrobates* Uhler to be described since the author (1954, So. Calif. Acad. Sci. Bull. 53(1):51-52) published a list of species of the Americas. The other species, *M. curracis* Drake and Roze (1954, Biol. Soc. Wash. Proc. 67:227-228) was described from specimens collected in Venezuela. Including these two the genus *Metrobates* now contains a total of 13 species and 3 subspecies.

Metrobates alacris n. sp.

APTEROUS FORM. Moderately large, plump, not flattened dorso-ventrally, brownish black, somewhat velvety, prominently marked on dorsum with

blue-gray and testaceous as described in structures. Female broader than male. Alate form unknown. Length, 4.50 mm.; width, 2.15 mm.

Head velvety black, with a broad, U-shaped mark at the base; eyes dark reddish fuscous; rostrum black-fuscous, shining, extending a little beyond prosternum, with the basal third of ventral surface of first segment testaceous, pubescent, without any long hairs on the underside of basal segment, with first segment subequal in length to other three combined; measurements—I, 120; II, 50; III, 30; IV, 40; segments II and III with usual modifications at apex; I stouter and bent a little near base. Pronotum small, twice as wide as long (82:40), broadly impressed medially, there orange tinted with bluish. Mesonotum very large, gradually widened posteriorly, broadly impressed along the median line, there with a broad, blue-gray, longitudinal stripe, the median length much less than basal width (90:164). Metanotum short, with a large bluish apical spot on each side. Sides of thorax without longitudinal stripe on each side. Metasternal spines wanting. Body beneath plumbeous, with acetabula, prosternum and median part of venter somewhat testaceous.

Abdomen with tergites slowly narrowed posteriorly, blackish with all but first and last segments plumbeous, last tergite not quite twice as long as preceding segment; connexiva plumbeous, with outer margin slowly rounded and narrowed posteriorly, at widest point less than half as wide as adjoining tergite; last ventrite nearly twice as long as preceding segment. Legs blackish fuscous, with coxae, trochanters and basal two-fifths of underside of femora of fore legs testaceous, the trochanters of middle and hind legs brownish; anterior femora without long hairs on ventral surface, unarmed, the tibiae with usual apical modification. Middle legs very long, the femora and basal part of tibiae beneath without hairs, only pubescence as on other femora, middle femora much shorter than tibiae (260:380); hind femora and middle tibiae both very long (360:380). Male genital segments blackish fuscous above, yellowish brown beneath; first segment convex above, with hind margin rounded, beneath feebly impressed on each side, without median ridge; male parameres rather short, strongly convex in front.

Type (male) and *allotype* (female), both apterous, Tallulah, La., July 17, 1930, H. B. Mills, in Drake Collection. Paratypes; 3 specimens, taken with type.

Separated from *M. hesperius* Uhler by the lack of moderately long and long hairs on the undersides of first antennal segment and middle femora (also basal part of middle tibiae), first antennal segment subequal to apical three conjoined (basal longer in *hesperius*), broader plumbeous markings on dorsum and very different male parameres. From *M. anomalus* Hussey it differs in markings of dorsum and fore legs, without hairs on ventral sides of basal antennal segment and middle legs (femora and basal part of tibiae) and slightly different male parameres. *M. anomalus* is a much darker species without prominent color markings, and the first and third antennal segments are also slightly longer.

BEES OF THE GENUS *ANTHEDONIA* MICHENER IN NORTH AMERICA (Hymenoptera, Apidae)[1]

WALLACE E. LABERGE

The purpose of this paper is to present new synonymy, a summary of the known distribution and the diagnostic characters of the two, relatively rare, species of the genus *Anthedonia*. The genus seemingly is restricted in its pollen sources to plants of the genus *Oenothera*. Among the eucerine bees, it is most closely related to *Melissodes*, and, especially, to the subgenus *Epimelissodes*. A more detailed description of the genus will be presented in a generic revision of the tribe Eucerini which is now in progress. A brief diagnosis of the genus is given below.

Anthedonia Michener

Anthedon Robertson, 1900, Trans. Acad. Sci. St. Louis, 10:53.

Anthedonia Michener, 1942, Jour. New York Ent. Soc., 50:282 (*N. nov.* for *Anthedon* Robertson, 1900, *non* Agassiz, 1846).

Abda Sandhouse, 1943, Proc. U. S. Nat. Mus., 92:521 (*N. nov.* for *Anthedon* Robertson, 1900, *non* Agassiz, 1846).

Type species: Melissodes compta Cresson, 1878, by original designation.

The following diagnostic characters are common to both sexes: maxillary palpus 4-segmented, segments in ratio of about 3:2:3:1; clypeus relatively flat, not protruding beyond face by more than half of width of eye in profile; malar area exceedingly short, mandible nearly reaching eye; tegula broadly rounded anteriorly; spatuloplumose hairs present between mesoscutum and scutellum, on metanotum and dorsum of propodeum, on basal half of metasomal tergum 1, in basal pale band on tergum 2 and in distal pale bands of terga 2-4. The females are distinctive in having the scopal hairs unbranched. The males are distinctive in having the first flagellar segment as long as the second, the last flagellar segment attenuate and the gonostylus abruptly bent near the middle (Figs. 1 and 2).

Anthedonia compta (Cresson)

Melissodes compta Cresson, 1878, Proc. Acad. Nat. Sci. Philadelphia, 30:199; 1916, Mem. Amer. Ent. Soc., 1:115.

Anthedon compta, Robertson, 1900, Trans. Acad. Sci. St. Louis, 10:53; 1905, Trans. Amer. Ent. Soc., 31:365; Cockerell, 1905, Canad. Ent., 37:267; 1906, Trans. Amer. Ent. Soc., 32:79, 84; Smith, 1910, Ann. Rept. New Jersey State Museum, 1909:693; Robertson, 1914, Ent. News, 25:72; Lutz and Cockerell, 1920, Bull. Amer. Mus. Nat. Hist., 42:593; Robertson, 1926, Ecology, 7:380; 1928, Flowers and Insects, p. 8; Cockerell, 1928, Univ. Colorado Studies, 16:114; 1934, Amer. Mus. Nov., no. 697, p. 9; Brimley, 1938, Insects of North Carolina, p. 462; Fattig, 1945, Emory Univ. Mus. Bull., 3:5.

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[1] Contribution no. 907, Department of Entomology, University of Kansas.

Melissodes (*Anthedon*) *compta* Viereck, 1916, Connecticut Geol. Nat. Hist. Surv., Bull. 22, p. 732.

Anthedonia compta, Michener, 1942, Jour. New York Ent. Soc., 50:282; 1951, *in* Muesebeck *et al,* Hymen. America North of Mexico, U.S.D.A. Agric. Monogr. No. 2, p. 1222.

Diagnosis: Female with interpunctural spaces of clypeus moderately shiny, with transverse shagreening dulling surface; hairs of head and sides of thorax ochraceous, of dorsum of thorax ferruginous; distal pale bands of metasomal terga 2 and 3 usually narrower than apical areas medially; apical pale band of tergum 4 with large median patch of brown hairs apically which is one third as wide as tergum or wider but does not completely interrupt the pale band anteriorly; pale pubescent bands of metasoma ochraceous; length, 14-18 mm.; width, 6.0-6.5 mm.

Male with punctures of clypeus slightly coarser than in *A. nevadensis;* hairs of head and thorax usually ochraceous laterally to ferruginous dorsally, occasionally paler due to fading in old specimens; distal pale bands of terga 2-4 usually slightly narrower than apical area medially; tergum 5 with a complete narrow pale pubescent band or without such a band, occasionally three spots (one median and two lateral) of pale pubescence are present; gonostylus sharply elbowed just below the middle, bare apically and distinctly capitate (Fig. 1); length, 13-18 mm.; width, 4.5-6.0 mm.

Type material: Female holotype from Georgia (Morrison coll.) is in the Academy of Natural Sciences of Philadelphia.

Distribution: A. compta is known from New Jersey in the northeast, west through Illinois and Colorado to Utah in the northwest and south to Georgia in the east and to the state of Durango, Mexico, in the west. The following is a list of the localities recorded in the literature:

COLORADO: Cheyenne Mountain, near Colorado Springs. GEORGIA: holotype labeled "Georgia"; either Atlanta or Stone Mountain (Fattig, 1945). ILLINOIS: Carlinville. NORTH CAROLINA: Asheville; Hickory; Marion; Moore Co. NEW JERSEY: Westville. PENNSYLVANIA: Philadelphia. TEXAS: Bexar Co.; Fedor, Lee Co.

New records are as follows: KANSAS: Kiowa Co., 1 ♂, July 6, 1911, F. X. Williams; Hoisington, 1 ♂, 1954, in Japanese beetle trap. MARYLAND: Cabin John, 1 ♀, August 18, 1914, R. C. Shannon, 1 ♂, August 18, 1914, J. C. Crawford. MISSOURI: St. Louis, 1 ♂, August 8, 1939, Japanese beetle trap. NEW MEXICO: Albuquerque, 1 ♂, July 23, 1950, R. H. Beamer; Mesilla, 2 ♂ ♂, July 15, 1952, R. H. and L. D. Beamer, Cheng Liang and W. E. LaBerge; Portales, 1 ♂, July 23, 1952, R. H. and L. D. Beamer, Cheng Liang and W. E. LaBerge. NORTH CAROLINA: Table Rock, 1 ♂, July 24, 1925, E. P. Meiners; Valley of Black Mountains, Sept. 2-31, 1906, 13 ♀ ♀, 3 ♂ ♂, W. Beutenmuller. TENNESSEE: Lawrenceburg, 1 ♂, August 4, 1948, L. D. Beamer. UTAH: Erda, 1 ♂, July 22, 1949, G. F. Knowlton; Liberty, 2 ♂ ♂, July 22, 1949, G. F. Knowlton. DURANGO: Nombre de Dios, 3 ♂ ♂, August 1, 1951, P. D. Hurd.

Anthedonia nevadensis (Cresson)

Melissodes nevadensis Cresson, 1874, Trans. Amer. Ent. Soc., 5:102; 1875, Report geog. geol. explorations and surveys west of 100th meridian, 5:726; Cockerell, 1897, Entomologist, 40:28; 1897, Bull. Univ. New Mex. no. 24, p.28; 1906, Trans. Amer. Ent. Soc., 32:79; Cresson, 1916, Mem. Amer. Ent. Soc., 1:124; Lutz and Cockerell, 1920, Bull. Amer. Mus. Nat. Hist., 42:607.

Eucera nevadensis, Dalla Torre, 1895, Cat. Hymen., 10:241.

Melissodes californica Smith, 1879, New species of Hymenoptera in the British Museum, p. 114.

Eucera smithii Dalla Torre, 1895, Cat. Hymen., 10:247 (*N. nov.* for *Melissodes californica* Smith, 1879, *non Melissodes californica* Cresson, 1878).

Melissodes smithii, Cockerell, 1905, Trans. Amer. Ent. Soc., 31:328; Lutz and Cockerell, 1920, Bull. Amer. Mus. Nat. Hist., 42:612.

Anthedonia nevadensis, Michener, 1951, *in* Muesebeck *et al,* Hymen. America North of Mexico, U.S.D.A. Agric. Monogr., No. 2, p. 1222.

Diagnosis: Female with interpunctural spaces of clypeus opaque, completely dulled by fine, regular shagreening; hairs of head and thorax pale ochraceous to ochraceous; distal pale bands of metasomal terga 2 and 3 usually wider than apical areas medially; apical pale band of tergum 4 without median, apical area of brown pubescence, or this area much less than one fourth width of tergum; pale pubescent metasomal bands white to slightly ochraceous; length, about 16 mm.; width, about 6.5 mm.

Male with punctures of clypeus fine, scarcely discernible; hairs of head and thorax white to ochraceous; distal pale bands of metasomal terga 2-4 usually as wide as apical areas medially or wider; pale band of tergum 5 as in *A. compta;* gonostylus relatively straight, not sharply elbowed but distinctly S-shaped, with minute hairs in the apical section to the tip and tapering gently to the tip, not capitate (Fig. 2); length, 13-17 mm.; width, 4.5-6.0 mm.

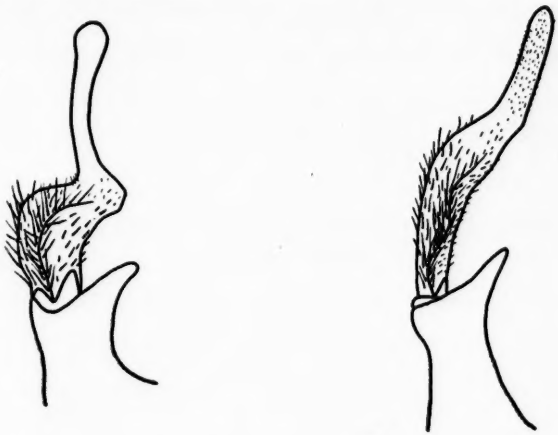
Type material: Lectotype male and two male paratypes of *nevadensis* from Nevada are in the Academy of Natural Sciences of Philadelphia. Lectotype female, here designated, lectoallotype male, here designated, and four paratypes (one male and three females) of *californica* from California are in the British Museum (Natural History).

Distribution: This species ranges from California in the northwest through Nevada southeastward to southwestern Texas and south to southern Durango in Mexico. In addition to the type material mentioned above the only record of this species in the literature is given by Cockerell, 1897. He records the bee from the Mesilla Valley, New Mexico. This record is dubious, since there has been some confusion as to the identity of *nevadensis* in the past.

New records are as follows: CALIFORNIA: Owen's Lake, 1 ♂, July 27, 1911, J. W. Aldrich (taken on *Asclepias* sp.). TEXAS: Big Springs, 1 ♂, June 20, 1947, L. D. Beamer; Fort Stockton, 1 ♀, July 1, 1948, P. and C.

Vaurie. DURANGO: San Juan del Río, 1 ♀, 15 ♂ ♂, July 30, 1947, C. D. Michener, at 5200 feet altitude (taken on *Oenothera* sp.).

Acknowledgements: I wish to thank Dr. Harold J. Grant, Jr. of the Academy of Natural Sciences of Philadelphia for comparing the terminalia of specimens of *A. nevadensis* with the lectotype and for the loan of the paratypes of this species. I am indebted to Dr. I. H. H. Yarrow of the British Museum (Natural History) for the loan of two cotypes of *Melissodes californica* Smith. The following persons were kind enough to lend me specimens from collections in their care: Dr. M. A. Cazier, American Museum of Natural History, New York City; G. F. Knowlton, Utah State Agricultural College, Logan, Utah; Dr. W. R. Enns, Univ. of Missouri, Columbia, Missouri; Dr. W. F. Barr, Univ. of Idaho, Miscow, Idaho; Dr. P. D. Hurd, Univ. of California.



1. 2.

EXPLANATION OF FIGURES

Left gonostyli of males, dorsal view, approximately ×26.5. 1. *Anthedonia compta* (Cresson). 2. *Anthedonia nevadensis* (Cresson).

BOOK NOTICE

LARRY W. QUATE
University of Nebraska

Insects of Micronesia. Volume 1, Introduction, by J. Linsley Gressitt. viii+257 pages. Bernice P. Bishop Museum, Honolulu. 1954.
Price, $3.50.

During the years 1947 to 1953 the Pacific Science Board (National Research Council) sent entomologists to Micronesia to make general col-

lections of the arthropod fauna. These collections were added to other material available from Micronesia and sent to various specialists who have agreed to study them. The results of these labors will appear in a series of volumes under the title of "Insects of Micronesia," which will have more than 115 authors each covering a limited portion of the terrestrial arthropod fauna. The work is to be primarily systematic, but available information on the immature stages, habits, ecology, and economic importance of the species will also be included. In addition to insects, this series will embrace nearly all terrestrial arthropods including the Arachnida, Chilopoda, Diplopoda, Symphyla, and terrestrial Isopoda and Amphipoda.

The introductory volume describes the environment, fauna, ecology, and a brief history of the Micronesian Islands. Its purpose is to aid the specialists picture the environment and to understand the climatic and other forces affecting the biota as well as to help other biologists using the systematic works and those who will do future field work in Micronesia.

The introduction will be followed by a bibliography of Micronesian entomology and the systematic reports and finally a general summary of the fauna, stressing zoogeography and speciation, will be prepared.

A NEW GENUS OF CHIGGER MITES (Acarina, Trombiculidae)[1,2]

LOUIS J. LIPOVSKY, D. A. CROSSLEY, JR., AND RICHARD B. LOOMIS[3]

Studies of American chiggers which have larvae with expanded sensillae revealed a group of three closely related species, all of which are new. These three species along with *Euschöngastia ikaoensis* (Sasa, *et al.*) of Korea and Japan differ from other species now placed in *Euschöngastia* in both their larval and nymphal stages, and therefore seem to warrant separation from *Euschöngastia*. A new genus is proposed for this group, and the new species are described below.

The type species is described in detail. The remaining two new species are compared to it: only the differences are listed. Each description is based on the holotype, with differences among the paratypes noted in parentheses. The terminology used is that of Wharton, *et al.*, 1951, augmented by Audy, 1954. The measurements are in microns.

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[1] This investigation was supported in part by a grant (E-476R) from the National Microbiological Institute, National Institutes of Health, U. S. Public Health Service. Most of the specimens upon which this paper is based were collected in connection with a contract (N6 ori 220 TO-2) between the University of Kansas and the Office of Naval Research.

[2] Contribution no. 908 of the Department of Entomology, University of Kansas, Lawrence.

[3] Present addresses are Army Medical Service Graduate School, Walter Reed Medical Center, Washington, D. C.; University of Kansas, Lawrence; and Long Beach State College, Long Beach, California, respectively.

Cheladonta new genus

TYPE—*Cheladonta micheneri* new species

Diagnosis. Larva with scutum roughly rectangular, having five scutal setae; sensillae expanded; cheliceral blade with a row of serrations on inner ventral edge of distal third; body broad anteriorly, usually extending over gnathosoma when engorged; legs II and III short, with basifemur and telofemur seemingly fused but with sutures visible. Closely related to *Neoschöngastia,* from which it differs in having the scutum not submerged beneath striated cuticle, and to *Euschöngastia, sensu lato,* from which it differs by having ventral teeth on the cheliceral blade. Seemingly not closely related to *Schöngastia* which differs in having large dorsal teeth on cheliceral blade, subpentagonal scutum and one mastitarsala I.

Description. Larva: Body with dorsal setal formula beginning 4-12, total approximately 42; ventral setal formula beginning 2-2, total setae approximately 34. Body striae pronounced and widely separated. Scutum roughly rectangular, only slightly emarginate near bases of scutal setae, with entire scutum slightly convex. Eyes 1/1 or absent. Cheliceral blade with serrations on inner ventral edge of distal third. Palpal tibia with three branched setae; palpal claw with 5 to 7 prongs; palpal tarsus with tarsala and 4 feathered setae. Legs each with seven segments; II and III short, with basifemur and telofemur seemingly fused, but with distinct sutures; subterminala and parasubterminala I present; 2 genualae I, 1 genuala II, 1 genuala III; without long nude whiplike setae on leg III.

Members of the genus are the new species *C. micheneri, C. ouachitensis* and *C. crossi,* and *C. ikaoensis* (Sasa, *et. al.*).

Cheladonta micheneri n. sp.[4]

Diagnosis. Larva with galeal seta nude; eyes absent or indistinct; palpal femur and genu each with one nude seta; palpal tibia with three branched setae; cheliceral blade with distinct row of serrations on distal third of ventrolateral edge.

Description of larva. Body (Figs. 9-10): Holotype (engorged) 667 by 532; color whitish (to brownish) in life. Eyes absent (or 1/1, indistinct and colorless in life). Dorsal setal formula approximately 4-12-10-8-4-2-2, total 42; humeral seta measures 42, anterior dorsal seta 39, posterior dorsal seta 41. Ventral setal formula 2-2- plus 20 (preanal) and 10 (postanal), total 34; anterior sternal seta measures 43, anterior ventral seta 22, posterior ventral seta 32. Total body setae 76. Striae widely separated and distinct.

Scutum (Fig. 5): Roughly rectangular, posterior edge emarginate; punctae small and moderately numerous; sensilla clavate with small barbs; bases of sensillae anterior to bases of PL setae; small ridges above sensillary bases. Scutal measurements of holotype: AW- 54, PW- 70, SB- 25; ASB- 16, PSB- 16, AP- 23, AM- 28, AL- 36, PL- 43, S- 35. Averages and extremes of five specimens: AW- 57 (54-60), PW- 75 (70-84), SB- 27 (24-33),

[4] Named in honor of Dr. Charles D. Michener, Chairman, Department of Entomology, University of Kansas, for his support and guidance of chigger studies.

ASB- 16 (13-17), PSB 15 (14-16), AP- 19 (18-23), AM- 27 (25-30), AL- 27 (23-36), PL- 40 (37-43), S- 34 (30-35).

Gnathosoma (Fig. 6): Cheliceral blade blunt, curved upwards, without apical tooth; ventral inner edge with a series of extremely fine serrations or "teeth," 10-14 in number, on distal third to apex. Cheliceral base heavy, nearly square, punctate. Galeal seta nude. Capitular sternum with a pair of long branched setae; palpal femur with one nude seta (occasionally with one branch), genu with one nude seta; tibia having dorsal seta with seven branches, ventral seta with three branches, lateral seta with eight branches; tarsus with tarsala (8μ) and four long plumose setae. Palpal claw short, slightly curved distally, with approximately six short prongs (five to seven prongs seen in specimens examined).

Legs (Figs. 11-12): Leg I coxa, trochanter and basifemur each with one branched seta; telofemur with five branched setae; genu with two genualae, one microgenuala and four branched setae; tibia with two tibialae, one microtibiala and eight branched setae; tarsus with tarsala (17μ), microtarsala, subterminala, parasubterminala, pretarsala and approximately 21 branched setae. Leg II coxa and trochanter each with one branched seta; basifemur with 2 branched setae; telofemur with three branched setae; genu with one genuala and three branched setae; tibia with two tibialae and six branched setae; tarsus with tarsala (17μ), microtarsala, pretarsala and approximately 16 branched setae. Leg III coxa and trochanter each with one branched seta; basifemur with two branched setae; telofemur with three branched setae; genu with genuala and three branched setae; tibia with six branched setae; tarsus with approximately 16 branched setae. All leg segments minutely and uniformly punctate. Claws normal, empodium clawlike. Basifemur and telofemur of leg II and leg III in close contact, and indistinctly divided, but division present (seen with phase contrast microscope).

Types. Larvae: Holotype, slide no. 6603, and 12 paratypes, nos. 6601-02, 6604-6611, and 6618-19, Snow Entomological Museum, University of Kansas, from 3 miles west of Lawrence, Douglas County, Kansas, host *Sylvilagus floridanus* (eastern cottontail), field no. RL491112-1, taken November 12, 1949, by Richard B. Loomis and Louis J. Lipovsky.

Specimens examined. Total 54 larvae, as follows: KANSAS. *Barber Co.:* 4½ mi. S, 1 mi. W Aetna, *Cynomys ludovicianus,* July 27, 1952 (KU 6622-27). *Douglas Co.:* Lawrence, *Neotoma floridana* (nest), Feb. 22, 1950 (KU 6617); 3 mi. W Lawrence, *Sylvilagus floridanus,* Nov. 12, 1949 (13, type series); *Jefferson Co.:* 5½ mi. N, ½ mi. E Lawrence, *Peromyscus leucopus,* Feb. 1, 1952 (KU 6620-21). *Johnson Co.:* Roeland Park, *Sylvilagus floridanus,* Nov. 10, 1953 (1). *Lyon Co.:* 2 mi. S Chalk, *Perognathus hispidus,* May 31, 1950 (KU 6615-16). *Morris Co.:* 2 mi. S Council Grove, *Peromyscus maniculatus,* May 31, 1950 (KU 6612-14). *Rawlins Co.:* 13 mi. S, 6 mi E McDonald, *Cynomys ludovicianus,* Aug. 9, 1949 (KU 6646-47). *Wyandotte Co.:* Kansas City, *Sciurus carolinensis,* Dec. 11, 1953 (1): 2 mi. W Kansas City, Dec. 13-14, 1953, *Peromyscus leucopus* (5)

and *Peromyscus maniculatus* (15). NEBRASKA. *Richardson Co.:* 6 mi. W Falls City, *Mus musculus,* Nov. 30, 1947 (KU 6629-31).

Cheladonta ouachitensis n. sp.[5]

Diagnosis. Larva similar to *C. micheneri,* but differs in having galeal seta branched and eyes 1/1, distinct.

Description of larva. Body: Holotype (unengorged) 241 by 162. Color probably whitish. Eyes 1/1, small. Dorsal and ventral setal formulae approximately that of *C. micheneri.*

Scutum (Fig. 3): Measurements of holotype: AW- 57, PW- 65, SB- 21, ASB- 14, PSB- 15, AP- 20, AM- 23, AL- 30, PL- 40, S- 35. Averages and extremes of five paratypes: AW- 55 (53-57), PW- 65 (63-66), SB- 24 (21-26), ASB- 15 (14-16), PSB- 13 (11-15), AP- 17 (15-20), AM- 25 (23-28), AL- 29 (25-30), PL- 40 (39-41), S- 34 (31-36).

Gnathosoma (Fig. 4): Galeal seta branched. Palpal tibia with lateral seta having four or five branches (occasionally nude).

Types: Larvae: Holotype, slide no. 6634 and 13 paratypes, nos. 6632-33 and 6635-45, Snow Entomological Museum, University of Kansas, from 2 miles south of Mena, Polk County, Arkansas, host *Cryptotis parva* (least shrew), field no. RL510303-2, trapped on March 3, 1951, by Richard B. Loomis and Harold A. Dundee.

Cheladonta crossi n. sp.[6]

Diagnosis. Larva similar to *C. micheneri,* but differs in having palpal femur and genu each with branched seta. Larva differs from *C. ikaoensis* in having wider PW (84-89μ) and in having numerous branches (more than 4) on palpal genual seta.

Description of larva. Body: Holotype (engorged) 575 by 497. Color in life unknown. Eyes absent (not seen in larvae examined). Dorsal and ventral body setal formulae approximately the same as in *C. micheneri.*

Scutum (Fig. 1): Measurements of holotype: AW- 61, PW- 85, SB- 29, ASB- 18, PSB- 17, AP- 24, AM- 26, AL- 33, PL- 47, S- 41. Averages and extremes of five paratypes: AW- 62 (60-64), PW- 86 (84-89), SB- 28 (26-29), ASB- 20 (18-22), PSB- 15 (13-17), AP- 25 (23-26), AM- 28 (26-31), AL- 32 (28-38), PL- 41 (36-49), S- (absent).

Gnathosoma (Fig. 2): Palpal femur and genu each with branched seta.

Legs: Leg III with tibia having one tibiala on one leg of two of five specimens.

Types. Larvae: Holotype, slide no. 6652, and four paratypes, nos. 6649-6651 and 6653, Snow Entomological Museum, University of Kansas, from Green Canyon, Cache National Forest, Cache County, Utah, host *Peromyscus maniculatus* (deer mouse), taken on June 11, 1953, by Earle A. Cross; and one paratype, no. 6654, from Spring Hollow, Cache National Forest, *Peromyscus maniculatus,* June 12, 1953, Earle A. Cross.

[5] The type locality is at the base of Rich Mountain of the Ouachita Mountains in southwestern Arkansas.

[6] Named for Earle A. Cross, Department of Entomology, University of Kansas, who collected the type series.

Cheladonta ikaoensis (Sasa, *et al.*) new combination

Neoschöngastia ikaoensis Sasa, Sawada, Kano, Hayashi and Kumada, 1951, Tokyo Iji Shinshi. 68:7, *type* from Ikao, Gumma Prefecture, Japan, host *Apodemus speciosus,* Nov. 27, 1950.

Euschöngastia ikaoensis, Sasa, Kumada and Miura, 1951, Tokyo Iji Shinshi. 68:19; Wharton and Fuller, 1952, Mem. Ent. Soc. Washington, 4:77; Sasa and Jameson, 1954, Proc. California Acad. Sci., 4th Ser., 28:259-261; Jameson and Toshioka, 1954, Pacific Sci., 8:14; Sasa, 1953, Japanese Jour. Exp. Med., 23:426 (*nymph*).

Diagnosis. Larva similar to *C. micheneri,* but differs in having palpal femur and genu each with branched seta. Larva differs from *C. crossi* in having scutum with narrower PW (less than 80μ for known measurements), and in having fewer branches on palpal genual seta (3 or less in Korean specimens examined).

Description of larva. Scutal measurements: Holotype; AW- 61.5, PW- 67, SB- 24, ASB- 18, PSB- 15.5, AP- 21, AM- 30, AL- 30, PL- 39, S- 33; specimen from southern Korea (Jameson and Toshioka, 1954) AW- 62, PW- 78, SB- 28, ASB- 22, PSB- 15, AP- 20, AM- 28, AL- 22, PL- 39, S- —. Palpal femur and genu each with branched seta (1-3 branches on genual seta). Leg setation and other characters as given for *C. micheneri.* Cheliceral teeth seen on one of three larvae examined from Yongp'yong, Korea.

Geographic distribution. Known from Japan: Kanagawa, Gumma, Oita, Yamanashi, Shizouka, Kumamoto and Shimane Prefectures (Sasa and Jameson, 1954); and southern Korea: 17 mi. SE Chorwon (Jameson and Toshioka, 1954).

Key to the larvae of the genus *Cheladonta*

1.	Galeal seta branched, eyes 1/1	*ouachitensis*
1′	Galeal seta nude, eyes 0/0 or indistinct	2.
2.	Setae nude on palpal femur and genu	*micheneri*
2′	Setae branched on palpal femur and genu	3.
3.	Scutum with PW greater than 80μ (North America)	*crossi*
3′	Scutum with PW less than 80μ (Asia)	*ikaoensis*

Taxonomic remarks. Several features of the larvae of this genus are different only in degree from known species in other related genera. However, these seem constant among the known species of *Cheladonta.* The scutum is rectangular and distinctive in shape, the punctae are few, there is little indentation around the scutal setae and only a small ridge is above each sensillary base. The body, when fully engorged, usually overlaps the gnathosoma carrying the scutum forward or even downward (the latter condition usually obtains on the slides), and the body seems to have shoulders. The striae are distinctive in their pattern and in being widely separated. The palpal claw has a distinctive shape, with part of the prongs arising near a curve in the base and the remaining prongs arising near the end. The small number of setae on the palpal tarsus seems of importance. The serrations on the ventrolateral edge of the cheliceral blade are pronounced, although difficult to see in poor preparations or when the chelic-

eral blade itself covers the area. The larvae are small in size and the legs are short. Legs II and III have extremely short segments and the femora seem fused, although a distinct suture can be found when carefully examined.

These species differ from species in other genera in the postlarval stages, perhaps even more than in the larval stage. Sasa (1953) has reared and described the nymph of *C. ikaoensis,* and the authors have reared *C. micheneri* and *C. ouachitensis.* Sasa's drawings, particularly the one of the nymphal scutum, well illustrate the distinctive features of this genus. The American species do not differ from it in any major detail. It is beyond the scope of this paper to present nymphal diagnoses, but the similarity of these forms to known *Neoschöngastia* nymphs seems worthy of mention. Descriptions and illustrations of nymphs will be presented in subsequent papers.

The fusion of the femora might prompt some workers to place *Cheladonta* in the subfamily Walchiinae, although Audy (1954) has stated that only those species lacking the AM scutal seta should be so arranged. *Cheladonta* does not seem to be closely related to *Pseudoschöngastia* Lipovsky or to *Walchiella* Fuller, both originally placed in Walchiinae. The closest relationship seems to lie with *Neoschöngastia* or possibly with certain species of *Euschöngastia,* both genera being in the subfamily Trombiculinae. Increased study of postlarval stages and redescriptions of poorly known larvae should clarify the relationships of these groups of chiggers.

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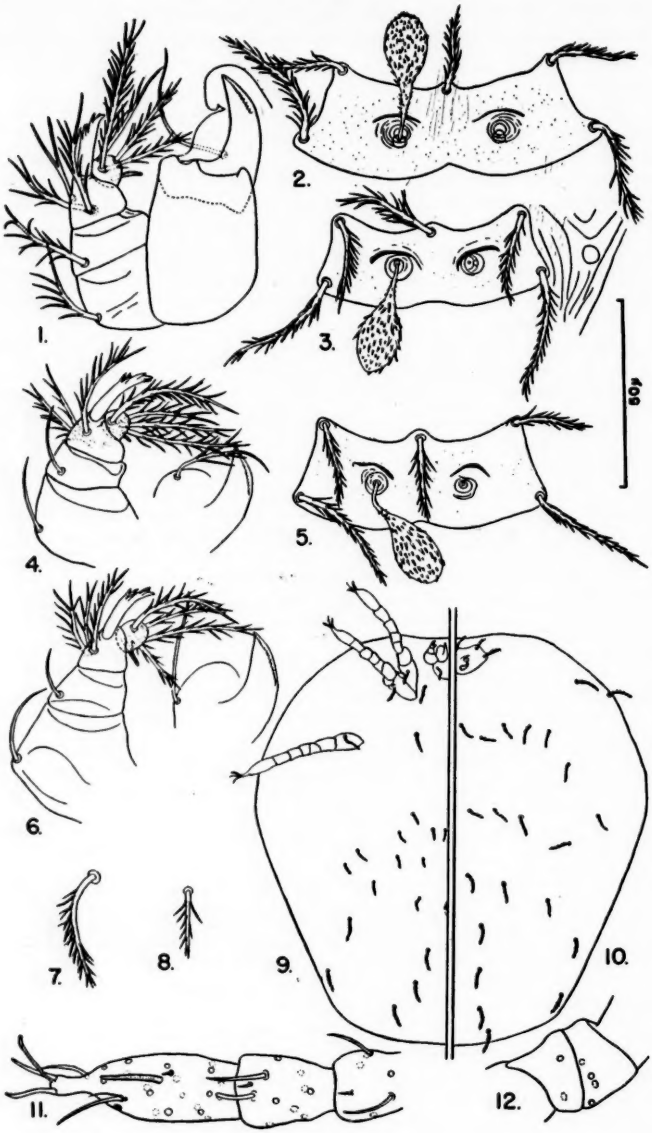
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DESCRIPTION OF A HITHERTO UNKNOWN MALE FUR MITE, *RADFORDIA SUBULIGER* EWING, 1938

ORVILLE SCHOMBERG
Entomology Department, Oklahoma A.& M. College, Stillwater, Oklahoma

H. E. Ewing (1938) in his excellent paper, North American Mites Of The Subfamily Myobiinae, New Subfamily (Arachnida), gives the original description of *Radfordia subuliger* in which the female only was described. The host was the small-eared harvest mouse, *Reithrodontomys humulis impiger,* taken at College Park, Maryland. The type slide is No. 1280 in the U.S. National Museum. It is the purpose of this paper to describe the male of this species.

Radfordia subuliger Ewing

Male. Segment II of leg I with a ventral, median, spinelike tubercle, and a median, dorsal seta nearly reaching lateral seta I. Tarsi II with two, equal, curved toothless claws. Tarsi III and IV each with a single, curved, toothless claw that is about twice as long as the claws on tarsi II. Dorsal setae as follows: Submedian I paired and about as long as distance between insertions of lateral setae II and III and located medianly between lateral setae II and III; submedian II, III, IV, and V equilength, unpaired, with submedian II inserted at anterior level of coxa IV; lateral I, II, III, and IV with barb; lateral I inserted at anterior level of coxa II; lateral II shortest of all lateral setae and inserted at posterior level of coxa II; lateral III inserted medianly between coxa II and III; lateral IV inserted at posterior level of coxa III and equilength to lateral seta III. Ventral setae as follows: Three pair of lateral setae, the first pair slightly forward of anterior edge of coxa II, the second pair slightly forward of anterior edge of coxa III while the third pair slightly forward of anterior edge of coxa IV; two pair of submedian setae, the first pair inserted at the posterior edge of coxa II while the second pair is inserted at the posterior edge of coxa IV, about one fourth the length of the ventral, lateral setae. Trochanter II, coxa III

EXPLANATION OF PLATE

Cheladonta crossi new species

FIG. 1, Dorsal view of left half of gnathosoma.

FIG. 2, Scutum.

Cheladonta ouachitensis new species

FIG. 3, Scutum and eye. FIG. 4, Dorsal view of left half of gnathosoma (excluding cheliceral base).

Cheladonta micheneri new species

FIG. 5, Scutum. FIG. 6, Dorsal view of left half of gnathosoma (excluding cheliceral base). FIG. 7, Body seta from first row of dorsals. FIG. 8, Body seta from first row of ventrals. FIG. 9, Ventral view of left half of body. FIG. 10, Dorsal view of right half of body. FIG. 11, Apical segments of leg I (branched setae omitted). FIG. 12 Femoral segments of leg II of right side (branched setae omitted).

and coxa IV each bear a dorsal whip-like seta. Outer pair of posterior marginal setae about as long as body. Genital opening dorsal and situated at anterior level of leg III. Two accessory setae flank the genital pore. The penis is rapier-shaped and reaches posteriorly to the level of leg IV.

Type host. *Peromyscus leucopus,* White-footed mouse. Collected by Farrell Copelin.

Type locality. Stillwater, Oklahoma, U.S.A.

Type slide. United States National Museum.

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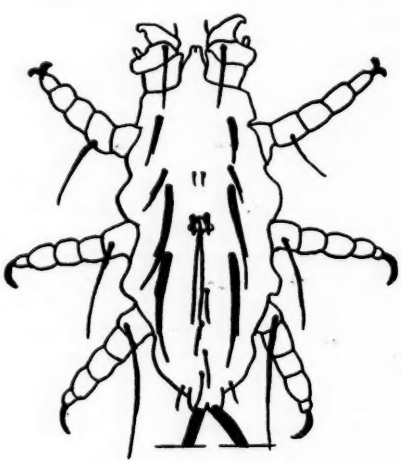


FIG. 1. Male dorsum.

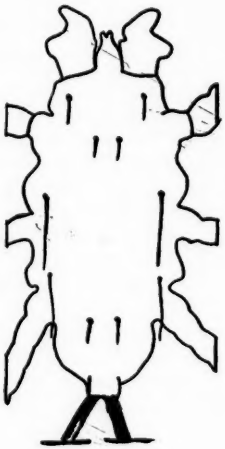


FIG. 2. Male venter.

RADFORDIA SUBULIGER EWING, 1938

A NOTE ON THE IDENTITY OF *STRIGIPHILUS BARBATUS* (Osborn)

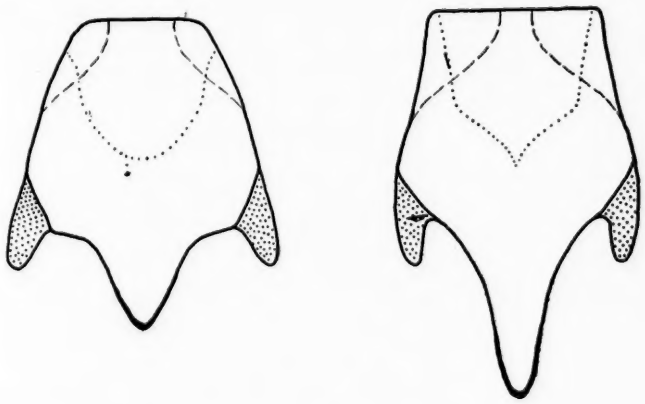
K. C. EMERSON
Stillwater, Oklahoma

Osborn, in 1902 (Ohio Nat., 2:201, pl. 14, fig. 1), described *Docophorus barbatus* from a series supposedly collected on the Rusty Blackbird. In his description he noted the similarity between this species and *Docophorus speotyti* Osborn=*Strigiphilus speotyti* (Osborn) found on the Western

Burrowing Owl, thus indicating that it's true host was probably one of the Owls. Through the courtesy of Dr. J. N. Knull, Ohio State University, five cotypes of *Docophorus barbatus* Osborn were examined to determine it's present status.

The cotypes agree in all details with material in the author's collection taken from *Asio otus wilsonianus* (Lesson), the Long-eared Owl. This host is found in Nebraska where Osborn's material originated. The species belongs to the genus *Strigiphilus* and does closely resemble *S. speotyti* (Osborn), but can be separated from it by size, and differences in the dorsal anterior plate of the forehead. Length of the head, in the male, is 0.7 mm and width is 0.62 mm in *barbatus;* while in *speotyti,* the head of the male is 0.61 mm in length and 0.50 mm in width. Differences in the dorsal anterior plate of the forehead are shown in figures 1 and 2. These figures are drawn to the same scale. The male genitalia of the two species are similar, with a corresponding difference in size.

Eichler, in 1949 (Beitr. tax. Zool., I:12, pl. 1, figs. 1-12), described *Neodocophorus asionis* from material collected from *Asio otus canariensis* Madarasz. His description and illustrations agree with the cotypes of *S. barbatus* and the form is therefore placed in synonymy of *Strigiphilus barbatus* (Osborn).



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EXPLANATION OF FIGURES

1. *Strigiphilus speotyti* (Osborn), dorsal anterior plate of forehead, female.
2. *Strigiphilus barbatus* (Osborn), dorsal anterior plate of forehead, female.

NOTES ON TWO SPECIES OF *GONIODES* (MALLOPHAGA)

K. C. EMERSON
Stillwater, Oklahoma

Goniodes submamillatus Emerson 1950

The original description (Jour. Kans. Ent. Soc., 23:121) was based on a small series of material supposedly collected from Mearn's Quail, *Cyrtonyx montezumae mearnsi* Nelson. Since then, the author has examined numerous collections of this species obtained from Gambel's Quail. One vial of specimens recently received from the University of Arizona Collection, contained the same data as the original material except for the host. All subsequent collections have also included specimens of *Lagopoecus gambeli* Emerson 1949, a species commonly found on Gambel's Quail, as well as *Goniodes submamillatus* Emerson. Therefore, it is believed that the material used in the original description was mislabeled through error; and that the true host for this species is Gambel's Quail, *Lophortyx gambelii gambelii* Gambel.

Goniodes leucurus Emerson 1952

The original description of this species (Jour. Kans. Ent. Soc., 25:29) was without illustrations. Through the courtesy of Dr. Harry Pratt, Communicable Disease Center, United States Public Health Service, Atlanta, Georgia, Mr. Chester J. Stojanovich has furnished the author with an illustration of the genitalia of the holotype male, which is shown herewith as figure 1.

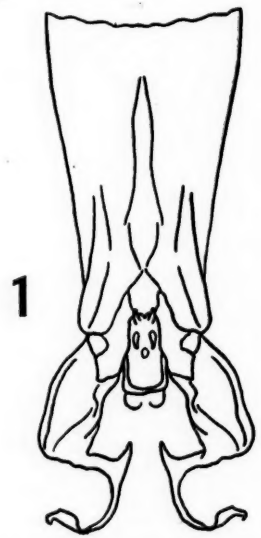

FIGURE 1. Male genitalia of *Goniodes leucurus* Emerson 1952.

NOTES ON THE BIOLOGY OF A POST OAK SCALE

(*Kermes pubescens* Bogue, Coccidae, Homoptera)[1]

W. J. BAERG
Department of Entomology, University of Arkansas

Post oaks were dropping terminals in such numbers during late May and early June of 1953 that some investigation was necessary. The terminals proved to be heavily infested with a soft scale that was subsequently identified by Harold Morrison as *Kermes pubescens* Bogue.

This scale insect was described in 1898 by E. E. Bogue, who reported it occurring on burr oak *(Quercus macrocarpa)* and dwarf chinquapin oak (*Q. prinoides*) in Kansas. King reported it in 1899 on white oak (*Q. alba*) and red oak (*Q. rubra*) from three localities in Massachusetts. He found it was parasitized by *Microterys cincticornis* Ashm.

Garman, in 1905, reported *K. pubescens* from Kentucky on burr and chinquapin oaks (*Q. muehlenbergii*). He cites J. G. Sanders reporting this scale from Columbus, Ohio. Jarvis in 1908 reported this scale from three localities in Ontario. He states that it is found always in cracks of the bark on the trunk and branches of oaks. It was not observed on very young twigs or leaves.

Lawson in 1917, reported it as being well distributed over the state of Kansas. He lists burr, chinquapin, and dwarf chinquapin as hosts.

Houser in 1918 reported the scale from the same four oaks already mentioned. He states that partly grown females, when foliage development starts, move from winter shelter to twig tips, leaf petioles, leaf midribs, and veins. The majority are on the leaves. Leaf distortion occurs simultaneously with establishment of scale insects. Males emerge in mid-May. By August 1, young have been produced. Burr oak is the most common host. Houser suggests the name "oak leaf crinkling kermes."

Kotinsky, 1921, gives a brief description of the seales and states that the females are attached to leaves and soft green wood. The males are in small felt-like white sacks on the wood of branches. The affected leaves begin to die toward the end of the season and clumps of them remain on the trees through most of the winter. The young at this time are in masses of tiny reddish lice-like insects in cracks of branches and twigs. When oak buds begin to open they migrate to and settle on midribs of leaves and on soft wood. At maturity the female becomes filled with eggs which hatch early July. The young infest further the year's growth. Two generations are produced during the year. Offspring of the second generation hatch late in fall and migrate to the bark for hibernation. Kotinsky calls it the pubescent oak kermes.

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[1] Research paper No. 1156, Journal Series, University of Arkansas. Published with the permission of the director of the Arkansas Agricultural Experiment Station.

McDaniel, 1930, calls it the burr oak kermes. She reports it on the four oaks previously mentioned. The scale is found on the terminal growth and veins of leaves from May till late in the season. Leaves attacked became distorted and puckered. There is one generation a year. Immature individuals, male and female, seek protected places on the bark for winter. The male cocoons are found on the underside of twigs and branches. Fertilization takes place in early spring. The females move to leaves as soon as these have developed sufficiently to serve as food. By the last of July young appear and establish themselves for the summer. The presnce of these insects causes distortion of leaves and terminals. During May, June, and July an abundance of honey-dew is excreted.

Flint and Farrar (1951) call it the burr oak kermes, and state that it is one of the most common of scales on burr oak, attacks also white and red oaks. It causes knotty growth of twigs, dead and distorted leaves scattered through the foliage.

Subsequently *K. pubescens* has been reported in 1952 and 1953. In Cooperative Economic Insect Report, from Mississippi by R. E. Hutchins. In 1954 it was reported from Ohio (Griswold), Oklahoma (Bower); Missouri[2] (Kyd, Thomas, Buchanan), and Arkansas (Warren). None of these report what species of oak was or were attacked.

As may be seen in this brief review of the literature *K. pubescens* appears to vary in its habits, even in number of generations a year. It has been given three different common names. There appears to be general agreement regarding host species.

I regret that I have to disagree but I have seen *K. pubescens* only on post oak, *Q. stellata.* There is but one generation in Arkansas. No evidence of a secretion of honeydew has been observed here.

K. pubescens first attracted attention in Arkansas in the summer of 1953 when reports and specimens were received from Conway, Perry, and Washington counties. This was during the first week of June. All reports emphasized the dropping of terminal twigs. The insects at this time were largely in the adult stage. So far as could be determined they were all females. Most of them were full of eggs, many contained one or two dipterous larvae instead of eggs.

In addition to these parasites there was a lady beetle, *Axion tripustulatum* (Deg.) (determined by O. L. Cartwright) presumably feeding on the scales. Practically every dropped terminal had at least one beetle or its larva.

The dropped terminals were all infested with the scale insects; some were very heavily infested. One count gave 90 scales on the terminal. Many infested terminals did not drop, many of these had brown dead leaves. It seems that, in part at least, the post oak gets rid of the unwanted tenant and its offspring by shedding of terminals.

Counts were made of the eggs in ten females which gave the following range: 101, 104, 153, 185, 270, 606, 663, 930, 1140, 1422.

[2] Geo. W. Thomas reports (May 28, 1955) that in Missouri *K. pubescens* was observed in 1954, on post oak only; the infestation characterized by dropping of twigs, extended over seven counties in the "boot heel" area. In 1955 no infestation has been observed.

Hatching of eggs began about June 10 and the dropping of terminals ceased soon after that. The young scales migrated largely to the leaves where they settled on the underside near the midrib and along larger veins. Some young settled where the old females are, or were, on new growth. These young are pale yellow, slender, measure .14-.21 mm. in length. Following the young in their dispersal is disappointing. On terminals where several thousand young presumably hatched, only a few young can be found on the leaves, and fewer on the new growth at the bases of leaves. By late July the scales exhibit two forms, a larger one, somewhat spindle-shaped, measuring from .28-.42 mm. in length. These are at first slightly orange-colored.

By the middle of October the scales begin to move from leaves to bark of twigs, on or slightly beyond, new growth. Both kinds settle here for the winter, the small ones far outnumber the larger ones. The former are not much larger than when they hatched. Migration continues until about the middle of November, when the leaves are turning red or brown. The larger scales are now a deep red or orange with white filaments around the edge and scattered over the back.

Through November and December both the larger and smaller forms are on the bark on or near the past season's growth. The small ones are still pale lemon-yellow and far outnumber the larger reddish-colored forms by about 100 to 1. The small individuals measure about .25 mm. in length; the larger ones about .6 to .9 mm.

During the first week of April the larger forms began to cluster about bases of buds which had begun to swell. By April 20 (1954) all scales had moved to new growth at bases of leaves. A few were on leaf stems, none on leaves. All scales were now, orange color, oval shaped and about 1 mm. long.

From this time on growth of the scales is very rapid. During the first week of May the scales have acquired the color of ripe persimmons, are approaching the globular shape, about 2.05x1.8 mm. The increase in size results in a very crowded condition on the terminals so that many scales are squeezed out of their normal shape. Four dark longitudinal bands mark the larger individuals.

By the 20th of May the scales are mostly globular, measure about 3.5x 3.3 mm. At this time the eggs have begun to develop. Scales are still very soft, easily ruptured when removed. During the first week of June the scales reach full development, measure now about 4.05x3.45 mm. The eggs in many of the scales have matured, i.e. are dry and loose, practically filling the body cavity. The eggs measure about .4x.175 mm., are pale yellow in color.

During the 1954 season, thanks to the effort of our Survey Entomologist, L. O. Warren, the extent of the distribution of *K. pubescens* was determined to cover in general 13 counties of Arkansas. This area represents a broad band extending diagonally across the state, from near the northwestern corner to a point about half way on the eastern border.

McDaniel, 1930, calls it the burr oak kermes. She reports it on the four oaks previously mentioned. The scale is found on the terminal growth and veins of leaves from May till late in the season. Leaves attacked became distorted and puckered. There is one generation a year. Immature individuals, male and female, seek protected places on the bark for winter. The male cocoons are found on the underside of twigs and branches. Fertilization takes place in early spring. The females move to leaves as soon as these have developed sufficiently to serve as food. By the last of July young appear and establish themselves for the summer. The presnce of these insects causes distortion of leaves and terminals. During May, June, and July an abundance of honey-dew is excreted.

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Hatching was first observed on June 10. The young are pale yellow and measure about 0.4x.02. Incubation is assumed to require about 20 days. The young scatter out on the leaves, many of them remain on the bark of new growth for a while.

During the spring development (1954) of the scales the dipterous parasites were conspicuously absent. None were observed. Male adult scales, excepting one doubtful specimen, were not observed. Observations during the summer were discontinued because of my absence. Examination of twigs in late October and again in late November showed that *K. pubescens* had practically failed to survive the summer. This season was apparently unprecedented for extreme prolonged high temperatures and drouth. It proved fatal to the scale insects as shown by a final examination of terminals on May 12 and 13 (1955). One single live specimen was all that could be found.[3]

NATURAL CONTROL

Aside from the weather which presumably was the dominant factor, lady beetles played an important role. Possibly more important were the dipterous larvae, in the 1953 season. These have not been positively identified. According to W. W. Wirth they are apparently a species of Phoridae. Insectivorous birds were attracted to heavily infested trees, and aided in controlling the scale. The dropping of terminals reduced the insect population.

SUMMARY

K. pubescens in Arkansas has one generation a year; it attacks, as far as known, only post oaks. A severe infestation is characterized by dense clusters of terminal leaves and by dropping of terminals in June. After two seasons of fairly heavy infestations the insects practically disappeared, due to parasites and extreme summer heat and drouth.

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[3] It seems fitting to state here that *K. pubescens* is the third insect that has practically disappeared when I was almost through with a study of it. The great elm leaf-beetle *Monocesta coryli* Say (Ark. Agr. Exp. Sta. Bul. 317, 1935) and the maple leaf scale, *Pulvinaria acericola* W & R (Ark. Agr. Exp. Sta. Bul. 470) are the other two.

EXPLANATION OF FIGURES

FIG. 1. *K. pubescens*, nearly mature. Photo by L. O. Warren.
FIG. 2. Leaf cluster due to heavy infestation of *K pubescens*. Photo by L. O. Warren.

NEW SOUTH AMERICAN SALDIDAE (Hemiptera)

CARL J. DRAKE
Ames, Iowa

The present paper is based entirely upon South American shorebugs, family Saldidae, in the collections of the University of Kansas and of the author. It contains the descriptions of a new species of *Micracanthia* Reuter, two new *Saldula* Van Duzee and four new *Pentacora* Reuter. Unless stated otherwise in the descriptions, the types are deposited in the Snow Collection of the above university. I am greatly indebted to Dr. H. B. Hungerford for the privilege of studying the undetermined saldids in the Kansas Collection.

The endemic species of the South American *Pentacora* Reuter are somewhat atypical of the genus as delimited by the genotype *Pentacora signoreti* (Guerin-Meneville), especially the brachypterous forms. In the macropterous form, the membrane of each hemelytron is furnished with five long cells placed side by side and closed apically by the peripheral vein. A different situation sometimes obtains here in brachyptery. In short-winged individuals, of the same species, either male or female, the membrane is abbreviated—sometimes greatly reduced so as to modify or even obscure the venational pattern. Ordinarily, however, there are five (occasionally four and rarely three) cells in the shortened membrane. In extreme cases of brachyptery, the veins are more or less confused and cells not clearly differentiated. And besides it is not uncommon to find five cells in the shortened membrane of one hemelytron and only four in the other, even in the same insect. Brachyptery is very common in the species of *Pentacora* inhabiting Chile, Peru and Argentina. In contrast the Pentacoras of North and Insular Americas are all macropterous insofar as known.

As our knowledge of the South American species of *Pentacora* is far from satisfactory, a revisional study of the genus is badly needed. Four South American saldids—*Saldula andensis* (Distant), *S. rogeri* (Distant), *S. sola* Drake, *S. auraucanica* (Kirkaldy)—are quite typical of the South American *Pentacora* and are here so transferred (NEW COMBINATIONS). In addition *Saldula brasiliensis* Drake and Carvalho is here suppressed as a synonym of *Saldula ventralis* (Stål) (NEW SYNONMY).

Micranthia hodgdeni, n. sp.

Head, pronotum and scutellum black, shining, sparsely clothed with grayish brown pubescence. Head with a flavous spot between each ocellus and an eye, the tylus, juga and labrum flavotestaceous. Hemelytra testaceous with inner corium (mostly apical half) and a subapical spot in outer corium fuscous to dark fuscous, feebly shining, moderately clothed with rather long, erect, dark brownish hairs, the pubescence golden. Legs pale testaceous, with apical part of femora and base of tibiae slightly brownish. Antennae with segment I pale testaceous; II brownish with distal half

fuscous (I,22; II,46). Rostrum long, pale brown, reaching between hind coxae. Body beneath black, clothed with pale pubescence.

Head with a shallow longitudinal grove in front of ocelli; ocelli approximate, each sloping slightly obliquely downward laterally; eyes very large, slightly fuscous. Pronotum strongly narrowed anteriorly, with exterior margins nearly straight; calli considerably elevated, set-off in front and behind by usual transverse furrows, with a deep discal impression; hind lobe deeply widely excavated behind, subequal in length to callus. Hemelytra narrow, widest just in front of middle, with corium divided by a longitudinal suture into inner and outer corium but without other sutures; membrane divided into four cells.

Length, 3.00 mm.; width, 1.25 mm.

Type (male), Hauchi Beni, Bolivia, Sept., 1920, W. M. Mann, Mulford Biological Expedition.

Separated at once from all other American species of *Micranthia* by the longly hairy vestiture of hemelytra. Named in honor of Dr. Burton Hodgden, who has made extensive studies of American Saldidae.

Saldula icolana, n. sp.

Moderately large, ovate, with prominent, pale markings as described in structures; head, pronotum and scutellum moderately shining, the hemelytra rather dull; abdomen (male) beneath black, with sutures between segments narrowly testaceous and (female) beneath whitish flavous with last segment dark testaceous; pubescence grayish white in both sexes. Length, 3.50 mm.; width, 1.75 mm.

Head with two flavous spots near inner margin of each eye, with a median longitudinal groove in front of ocelli; ocelli opal, nearly touching each other; frons with apical callosites narrow, flavous and meeting within; tylus and labrum brownish. Rostrum flavous with apex blackish, extending between hind coxae. Antennae blackish fuscous with first segment more brownish, shortly pilose, measurements—I, 25; II, 50; III, 44; IV, 45. Middle and fore acetabula with inferior part whitish. Legs slightly brownish, with bases of femora and trochanters testaceous, last tarsal segment dark fuscous, the coxae reddish fuscous.

Pronotum about three times as wide at base as median length (120:38), with lateral margins straight and broadly margined (above and beneath but not at apex) with flavous; callus rather high, set-off with usual transverse furrows, with the deep discal impression open behind; hind lobe finely rugulose, about three-fourths as long as callus. Scutellum clothed with grayish brown pubescence like pronotum, the median length and width subequal (72:75). Hemelytra with markings pale and conspicuous; clavus with two small testaceous spots; corium with three spots (two white spots along outer margin and a testaceous spot near upper apical corner); outer corium with an apical white spot; embolium almost entirely testaceous; membrane brownish, divided into four cells, the veins dark fuscous.

Type (male) and *allotype* (female), Nova Teutonia, St. Catarina, Brasil, Sept. 25, 1950, Fritz Plaumann, in Drake Collection. *Paratypes:* 22

specimens same data as type; 9 specimens, Nova Teutonia, Nov. 22, 1948; 3 specimens, Nova Teutonia, Feb. 27, 1947; and 1 specimen, Nova Teutonia, Dec. 23, 1946.

Very similar in color, markings and general aspect to *S. ventralis* Stål, but quite distinguishable by its black terminal segment of antennae, more ovate form, darker legs, especially coxae. This species has been wrongly named in collections as *S. brasiliensis* D. & C., which is a synonym of *S. ventralis*.

Saldula zelena, n. sp.

Head with front, most of vertex, juga and tylus flavotestaceous; area occupied by ocelli, excavated part within each eye, and narrow hind part of head blackish; vertex in front of ocelli and front longitudinally grooved; ocelli separated by less than half the diameter of an ocellus; labrum and rostrum brownish, the latter extending between hind coxae. Antennae shortly pubescent, brownish fuscous, measurements—I, 22; II, 40; III, 36; IV, 40. Middle and front acetabula with inferior parts whitish. Legs testaceous with brownish tinge; coxae ferrugineous with bases whitish; trochanters and bases of femora whitish testaceous, most of lateral and inferior surfaces of anterior femora brown. Length, 3.35-3.80 mm.; width, 1.50 mm.

Pronotum wide, basal width three times median length (110:35), with outer edge slightly convex, clothed with short grayish pubescence; calli large, set-off by usual transverse furrows, a little longer than hind lobe; explanate margins whitish flavous (above and beneath) with both ends blackish. Scutellum slightly raised, transversely impressed near the middle, slightly wider at base than median length (80:70), concolorous with pronotum, rather densely clothed with short, semireclining, brownish pubescence. Hemelytra rather densely clothed with short, suberect, golden pubescence, clavus with two small spots (basal and subapical) outer corium with basal half and spot in apical part testaceous; embolium whitish testaceous; membrane pale fuscous or brownish, divided into four cells, the veins dark fuscous. Male unknown.

Type (female), Boqueron del Pedro, Abad Cordillera Aqui, Dept. Loreto, Peru, Aug. 8, 1946, F. Woythowski. *Paratypes:* 12 specimens, same data as type.

Similar to *S. verdica* Drake and Hottes, but smaller, parallel-sided and clothed with slightly longer pubescence.

Pentacora amazona, n. sp.

Elongate-ovate, black with prominent pale markings on hemelytron, the head, pronotum and scutellum shining. Head black, without distinct longitudinal furrow; ocelli opal, separated by less than half of the diameter of an ocellus; vertex with long flavus stripe adjacent to each eye; front without apical callosities; tylus and juga flavous, the labrum brownish. Rostrum flavotestaceous, extending between hind coxae. Antennae with segments I and II testaceous and III and IV dark fuscous, pubescent, also with scattered hairs twice as long as diameter of segment, measurements—

I, 15; II, 52; III, 38; IV, 40. Legs flavotestaceous, with tips of fore and middle legs embrowned. Body beneath black, with hind margins of abdominal segments narrowly testaceous, the pubescence grayish. Length, 4.00 mm.; width, 1.75 mm.

Pronotum moderately narrowed anteriorly, with lateral margins straight and narrowly margined with testaceous or fuscous, with a basal stripe on inferior side of explanate margins, the basal width three times median length (115:35); callus quite low, not prominent, with a deep discal impression. Scutellum with basal width and median length subequal, with shallow impression scarcely in front of middle. Hemelytra blackish fuscous, coated with a little bluish pruinose, rather densely clothed with rather short, nearly erect, golden brown hairs; clavus with subapical brownish spot; inner corium with two pale spots in basal half, the apical half paler, largely brownish testaceous, with spots not clearly defined; outer corium with a large subbasal, a small median, and a large apical spot brownish testaceous or testaceous.

Type (male), San Indelfonso, Rio Utcumbromba, Amazonas, Peru, July 20, 1936, F. Woythowski.

As the veins of the membrane are not clearly indicated, it is impossible to state whether there are four or five cells present. It is assumed from general appearance that there are five cells in the membrane of each hemelytron. Separated at once from its congeners by the hairy clothing of dorsal surface and low callus.

Pentacora regilla, n. sp.

Moderately large, female larger than male, black with head, pronotum and scutellum deep black and shining, the hemelytra not so dark, dull and with several pale spots; exterior margins of pronotum and hemelytra narrowly trimmed with flavous or testaceous. Length, 3.60 mm. (male) and 4.30 mm. (female); width, 1.85 mm. (male) and 2.30 mm. (female).

Head with a shallow, median, longitudinal furrow, with two small pale spots near each eye; front without apical callosities; tylus and labrum with median part flavous. Rostrum reaching between hind coxae. Antennae slender, pubescent, with some short hairs, very black, with inferior side of first segment partly flavous, measurements—I, 24; II, 46; III, 40; IV, 40. Legs flavotestaceous with femora prominently spotted with fuscous, the inferior sides of all femora black; fore tibiae with dorsal and ventral stripes on basal three-fourths of segment, the middle and hind tibiae with dorsal stripe only; hind femora shorter than tibiae (100:140).

Pronotum with basal width three times median length (110:36), moderately narrowed anteriorly, with outer margins straight; callus moderately large, with the large discal impression open behind, with a small impression on each side of discal; explanate margins beneath with a rather broad, marginal, flavous stripe on the basal three-fourths. Hemelytra with considerable bluish on corium and membrane, the golden pubescence slightly longer than on scutellum; clavus with a small, subapical spot yellowish; inner corium with three or four small yellowish spots; outer corium and embolium with three, large, whitish testaceous spots; membrane bluish

black-fuscous, divided into five cells, each cell with one or two whitish spots, the veins broadly black-fuscous.

Type (male) and *allotype* (female), Puerto Puyuhaupi, South Chile, Dec. 12, 1937, H. Scharbe, in Drake Collection. *Paratype:* 1 specimen, same data as type.

Size, black markings on legs, and the narrow, flavous margins of pronotum and hemelytra distinguish at once this insect from its South American congeners.

Pentacora pillaona, n. sp.

Comparatively large, black, shining, the hemelytra dark fuscous with prominent flavotestaceous markings and white spots as described in structures. Legs testaceous with tips of femora and tarsi slightly shaded with brownish. Length, 4.75 mm.; width, 2.00 mm.

Head with vertex almost flat, with two flavous spots near each eye (one near front margin of eye and other opposite ocellus); ocelli narrowly separated, each sloping slightly outward; front without distinct longitudinal furrow, without small, apical, flavous callosity in front of each eye; tylus and labrum brownish testaceous. Rostrum extending between metacoxae, flavous with inferior side slightly embrowned. Antennae long, slender, shortly pilose; segment II slenderest, pale fuscous; III and IV dark fuscous; measurements—I, 22; II, 70; III, 46; IV, 46. Legs testaceous with apical part of femora and tibiae slightly brownish, the femora with brownish spots; spines of tibiae fuscous. Acetabula margined with testaceous.

Pronotum deep black, shining, clothed with short, grayish brown pubescence, moderately narrowed anteriorly, with outer margin straight and narrowly edged with fuscous; collum low, broad, not extending on explanate margins, set-off in front and behind by the usual transverse furrow, with a large discal impression (open behind) and a smaller impression on each side of it; hind lobe finely transversely rugulose, about two-thirds as long as callus, undersides of explanate margins testaceous posteriorly (not visible from dorsal aspect); basal width and median length of pronotum (140:50); basal width and median length of scutellum subequal, the vestiture as on pronotum. Hemelytra dark fuscous with a little bluish, especially on pale spots; clavus with a median subapical white spot; inner corium with four or five white spots, the outer corium with three white spots; embolium brownish testaceous with basal part dark; membrane yellowish brown, without dark spots, divided into five cells. Body beneath slightly shining, blackish with margins of ventrites narrowly brownish testaceous, clothed with short, grayish brown pubescence.

Type (female), Pillao, Peru, Dept. Huanuco, elevation 2,700 meters, Feb. 11, 1946, Felix Woythowski.

Separated from *P. regilla,* n. sp. by longer antennae, concolorous pronotum, paler hemelytra with slightly shorter pubescence.

Pentacora perula, n. sp.

Head blackish, with a brownish spot between each ocellus and an eye; tylus, juga and labrum brownish testaceous; ocelli opal, almost contiguous

within; front a shallow, median, longitudinal furrow; rostrum pale fuscous, extending between hind coxae. Antennae fuscous with basal segment brownish testaceous and last two segments blackish, pubescent, measurements—I, 25; II, 62; III, 40; IV, 40. Legs testaceous, with femora prominently spotted with fuscous; coxae brownish ferrugineous; acetabula of fore and middle legs whitish towards inferior margin. Abdomen beneath fuscous with posterior margins of segments testaceous. Length, 3.30-3.50 mm.; width, 1.65 mm.

Pronotum blackish, shining, with lateral margins (both above and beneath) margined with testaceous or brownish testaceous, slowly narrowed anteriorly, with exterior margins nearly straight, densely clothed with grayish brown pubescence, the basal width three times median length; callus large, high, with a large discal impression (open behind); hind lobe finely rugulose, less than half as long as callus; scutellum deep black, shining, the pubescence as on pronotum, basal width slightly greater than median length (65:55). Hemelytra dark fuscous, prominently marked with whitish spots, the veins blackish fuscous; clavus with a subapical testaceous spot; inner corium with five whitish testaceous spots, the outer corium with three to five whitish testaceous or flavous spots; embolium margined with flavotestaceous; membrane brownish fuscous, with one or two whitish spots in each cell, divided into five cells, sometimes (short-winged) with vein between fourth and fifth cells wanting, then four-celled. In long-winged form, hemelytra with large membrane and five cells clearly defined.

Type (macropterous male) and *allotype* (brachypterous female), Andes Mts., elevation 2,800 mm., Prov. Haunta, Dept. Ayacuche, March 20, 1941, Peru, F. Woythowski. *Paratype:* 1 specimen (broken) same label as type.

Differs from *P. andensis* (Distant) by smaller size, less densely pubescent, without long hairs on antennae, smaller pronotum and larger pale markings on hemelytra.

Pentacora bucayana, n. sp.

Moderately large; head, pronotum and scutellum deep black, shining, clothed with very short, grayish brown pubescence; hemelytra distinctly transversely convex, dark fuscous, dull, with markings as described below, the pubescence rather short, golden. Body beneath blackish fuscous, with segments of abdomen narrowly bordered with brownish testaceous, the last segment behind white. Length, 3.30 mm.; width, 1.80 mm. (macropterous); Length, 3.00 mm.; width, 0.92 mm. (brachypterous).

Head with vertex nearly flat, with two flavous spots adjacent to each eye; ocelli small, sloping obliquely outward, separated by less than the diameter of an ocellus; front with a median, longitudinal sulcus, without apical callosities; tylus and juga flavofuscous, with grayish pubescence. Antennae shortly pilose, black-fuscous with first segment testaceous and second brownish, measurements—I, 25; II, 64; III, 37; IV, 42. Rostrum pale fuscous, extending between hind coxae. Legs fuscous, with small black spots on femora.

Pronotum more than twice as wide at base as median length (116:42), moderately narrowed anteriorly, with outer margins straight and narrowly trimmed with testaceous or brownish testaceous (both upper and lower sides), callus set-off by the usual transverse furrows, with large discal impression (opened behind) and a smaller impression on each side; hind lobe feebly rugulose, not quite half as long as callus. Scutellum with color and pubescence same as pronotum, scarcely wider at base than median length (75:70). Clavus dark, dull, with a basal and apical whitish spots; inner corium with four whitish spots, the outer corium with four larger whitish spots; embolium whitish testaceous; embolium brownish testaceous, divided into four cells, the veins dark fuscous. Brachypterous form much shorter, not very convex, the hemelytra shorter, especially membrane. (Measurements: 80 units equal 1 mm.)

Type (female), Bucay, Ecuador, Oct. 16, 1923, F. X. Williams. *Paratype:* one female (antennae missing), same data as type.

The transversely convex hemelytra, brownish fuscous legs, and the deep black, shining and inconspicuously pubescent pronotum and scutellum distinguish this species from its near relatives.

TWO NEW SPECIES OF *DIKRANEURA* (Homoptera: Cicadellidae) from Mexico[1]

J. G. BORLAND

These species are described from two series of *Dikraneura* taken 9 miles northwest of Jalapa, Vera Cruz, Mexico, on December 31, 1949, by R. H. and L. D. Beamer. These two species belong to a very closely related group, and can be determined with certainty only by the genitalia. Holotypes, allotypes and series of paratypes are in the Snow Entomological Museum at the University of Kansas. Paratypes of each sex will be sent to the Ohio State University and to the United States National Museum.

The writer wishes to express his gratitude to Dr. R. H. Beamer of the University of Kansas for the opportunity to study this group of insects and for his assistance in technical matters. Thanks are also due Dr. D. M. DeLong of the Ohio State University for his kindness in lending the type specimen of *Dikraneura stonei* for study and comparison.

Dikraneura vittata n. sp.

Resembling *Dikraneura stonei* Ruppel and DeLong in general form and coloration. Ground color light tan; vertex and pronotum with two dorsal, median, longitudinal, red vittae extending to posterior margin of pronotum; each clavus with two red stripes extending its length; each corium with a longitudinal medium red stripe.

Genitalia: Pygofer hooks anchor-shaped, resembling those of *Dikaneura serrata* DeLong and Caldwell, but lacking the strong ventral apical points

[1] Contribution no. 901 of the Department of Entomology, University of Kansas, Lawrence.

of this species; slightly similar to *D. stonei* but lacking the median dorsal point. Aedeagus bilaterally compressed, slightly recurved, bearing a pair of simple processes at middle of ventral margin and a small, strongly recurved process at its apex. Gonopore posterior to median processes.

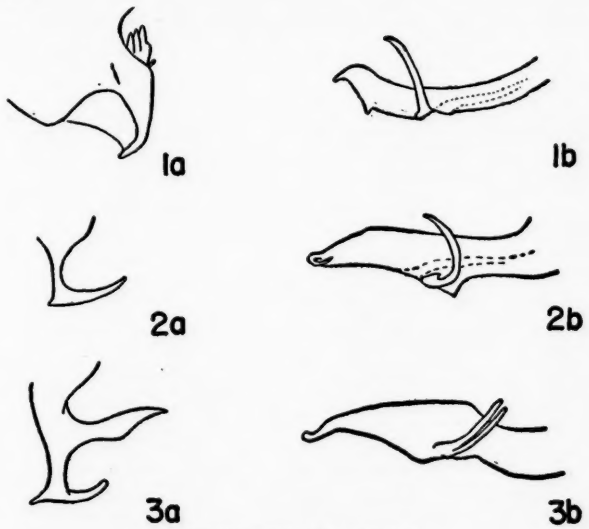
Type material: Holotype male, allotype female, 18 male and 6 female paratypes.

Dikraneura beameri n. sp.[2]

Identical with *D. vittata* and *D. stonei* in form and color, but with dorsal vittae somewhat stronger, especially in male. Pygofer hooks differ from those of above species by short, robust form and anteriorly directed basal processes. Length approximately 6.4 mm.

Genitalia: Pygofer hooks simple with broad bases, each curving upward to a dorsal apical point, and displaying a median tridentate process and a minute fingerlike process which extends anteriad from pygofer base. Aedeagus bilaterally compressed, broader apically than at its base; bearing two long processes distal to middle of ventral margin. Aedeagus moderately recurved at apex. Gonopore anterior to ventral processes.

Type material: Holotype male, allotype female, 38 male and 11 female paratypes.



EXPLANATION OF FIGURES

1a, pygofer hook of *D. beameri;* 1b, aedeagus of *D. beameri;* 2a, pygofer hook of *D. vittata;* 2b, aedeagus of *D. vittata;* 3a, pygofer hook of *D. stonei;* 3b, aedeagus of *D. stonei*. The pygofer hook of *D. stonei* is a reproduction of DeLong's drawing in the original description; the aedeagus of *D. stonei* was drawn from a photograph taken from a temporary slide mount, hence is lacking in detail. All other figures were drawn from photographs of permanent slide mounts which are in the Snow Entomological Museum at the University of Kansas.

[2] Named for Dr. R. H. Beamer, collector of the holotype.

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